TECHNICAL MANUAL

MAINTENANCE QUALITY CONTROL PROCEDURES FOR JP-7 AND THERMALLY STABLE TURBINE FUELS

(ATOS)

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INTRODUCTION

1. PURPOSE.

The purpose of this technical order is to provide quality control for the proper receipt, storage, and issue of JP-7 and Thermally Stable (JPTS) turbine fuels.

2. SCOPE.

This technical manual is intended to be used in conjunction with existing directives governing fuels operations, however, this technical order will take precedence where there is a conflict with other publications.

CHAPTER 1
GENERAL

1.1 GENERAL.

1.2 ACCOUNTABILITY.

Inventory and accounting procedures for JP-7 and JPTS fuels will be in accordance with directives issued by DESC-MI, Lackland AFB TX 78236-9828.

1.3 ORDERING PROCEDURES.

JP-7 and JPTS fuels require special ordering and forecasting procedures which will be furnished cognizant fuels management officers on a NEED TO KNOW basis by DESC-MIS through the appropriate Command Fuels Management Office.

1.4 QUALITY CONTROL (QC) PROCEDURES.

a. Applicable information in T.O. 42B-1-1 should be used for general guidance. In the event of conflict between the text of this document and T.O. 42B-1-1, the text of this document shall take precedence. Questions or comments pertaining to the procedures specified in this technical manual should be addressed to: DET 3, WR-ALC/AFTH, 2430 C St, Bldg 70, Area B, Wright-Patterson AFB, OH 45433-7632.

b. Sampling and testing instructions specified in this technical manual are considered minimum requirements to maintain proper quality of JP-7 and JPTS fuels. At the discretion of the responsible fuels management, suspect fuel will be placed on quality hold status and samples submitted to the appropriate area fuels laboratory. The applicable Major Command, HQ 8AF/LGSF, and DET 3, WR-ALC/AFTH will be notified by message or electronic mail of the suspect fuel and the following information will be provided: amount of fuel on hold, brief description of suspected problem, date and shipping tracking numbers of samples submitted to area lab, assistance required.

c. Disposition instructions for fuel in QC hold status will be provided by DET 3, WR-ALC/AFTH upon evaluation of laboratory test results.

1.5 RESPONSIBILITIES — QUALITY CONTROL.

The local Fuels Flight is responsible for surveillance of JP-7 and JPTS fuels, dispensing equipment, and proper training of assigned personnel. The Fuels Information Service Center NCOIC will provide guidance in the development of operating instructions and procedures for the storage, handling, sampling, and issuing of JP-7 and JPTS. Inspection requirements will be performed in accordance with AFI 23-201.

1.6 FORMS.

a. AFTO Form 150, Base Fuels Sampling and Testing Record – when an automated program (FAS or FAST) is not available for tracking samples the AFTO Form 150 will be prepared daily and maintained in the fuels laboratory. Fuel sampling records will be maintained for at least 6 months. Laboratory personnel engaged in testing tanker aircraft sump samples of JP-7/JPTS will provide aircraft maintenance personnel with a duplicate copy of flash point and API gravity results. The results become part of aircraft records representing the fuel onboard the aircraft until another set of sample results replaces them due to resampling.

b. AFTO Form 475, Fuels and Lubricants Sample – this is a sample tag used to identify the product being sampled. The AFTO Form 475 is attached to samples being shipped to off-base laboratories. All pertinent information relative to the sample being submitted will be included on this form, i.e., sample number, manufacturer, batch number, tank numbers, servicing unit, aircraft, date, etc.

CHAPTER 2
JP-7 AND JPTS FUEL CHARACTERISTICS

2.1 JP-7 AND JPTS FUEL CHARACTERISTICS.

JP-7 and JPTS are narrow-cut kerosene type fuels with several critical properties which are extremely sensitive to contamination. Flash points are 140°F minimum for JP-7, and 110°F for JPTS. Both have a negligible vapor pressure. In general, their burning characteristics are similar to those of a high quality charcoal lighter (low in volatility and smokeless).

2.2 CONTAMINATION.

Just as with any other petroleum product, contamination of JP-7 and JPTS can be categorized as chemical, material, or biological.

2.3 CHEMICAL CONTAMINATION.

Chemical contamination occurs when a product is inadvertently mixed with another product. Chemical contamination could be caused by inadvertently mixing with gasoline, JP-5 or JP-8 type fuel, or other chemical products such as solvents. An example of this would be the loading of a vessel which had previously contained MOGAS without proper cleaning of the vessel. This type of contamination would be detected by the flash point test. Chemical contamination of JP-7 and JPTS by other fuels is prevented by isolating handling systems, and proper flushing and cleaning of transportation equipment prior to their entry into service.

2.4 MATERIAL CONTAMINATION.

Material contamination of JP-7 and JPTS consists of water and sediment.

a. Water contamination occurs when it comes in contact with and is suspended or occurs free in a petroleum product. Water contamination could be a result of moisture condensing in a pipeline or tank. Free water can be detected visually or by use of the Aeronautical Engine Laboratory (AEL) Free Water Detector or Gammon Aqua Glo Detector. Water contamination is prevented by removing water bottoms and draining sumps and through the proper maintenance of transport systems, storage facilities, and filitration systems.

b. Sediment contamination normally appears as dust, powder, grains, or flakes suspended in fuel. Sources of sediment can be transport vessels, vented air, elastomers, and talc from fuel hoses. These particles may be micronic in size and so small they cannot be seen. To detect this contamination, a sample of the fuel is filtered through a very fine filter. This filter is then compared to standards to determine the amount of sediment present. Sediment contamination is prevented by use of clean vessels, properly maintained lines and tanks, good servicing techniques, and by keeping product out of contact with air.

2.5 BIOLOGICAL GROWTH.

Water in JP-7 and JPTS storage vessels can develop a sludge-like consistency as a result of biological growth. Such growth can contribute to fuel degradation. To prevent biological contamination, water must be effectively removed from the fuel system components.

2.6 EFFECT OF CONTAMINATION.

Trace amounts of contaminants can cause JP-7 and JPTS to become unserviceable. The cleanliness level of these fuels must be maintained to a higher degree than for any other type fuel procured by the Air Force. To further emphasize the need for such stringent precautions, certain critical properties are explained and description given as to how these properties are affected by contaminants.

a. High Temperature Stability – JP-7 must be able to withstand high temperatures (up to 600°F) without decomposing. JPTS must be able to withstand temperatures up to 550°F. When other jet fuels are exposed to such temperatures, they decompose by leaving a black carbon deposit (coke) on the surface of the container. Although JP-7 and JPTS are refined so that they will not leave a carbon residue at high temperatures, small amounts of contamination (both chemical and material) will degrade the thermal stability property of both.

b. Flash Point – when exposed to an ignition source, fuel with a low flash point gives off enough combustible vapors to produce a fire at practically all ambient temperatures. Under the same conditions, the temperature of JP-7 must be raised to 140°F or higher to produce a flash.

c. Pumpability – the clogging of system lines and strainers with particles of sediment has long been regarded as a problem with jet fuel systems. JP-7 and JPTS must have less sediment than other fuels, since they are pumped at high temperatures. At

high temperatures, traces of sediment not only are harmful because of their clogging tendency, but they are abrasive and damaging to pumps, servo valves, gears, etc.

2.7 SIGNIFICANCE OF FUEL PROPERTIES.

JP-7 and JPTS fuels are procured under Military Specifications MIL-PRF-38219 and MIL-PRF-25524 respectively and must meet the stringent requirements of these specifications before they are accepted by the Air Force. The values for flash point, API gravity, and FSII content from samples obtained at the refinery before the fuel is released for shipment are indicated on the Government Bill of Lading/Commercial Bill of Lading (GBL/CBL) or DD Form 250. Significant changes in base level values for flash point and API gravity from GBL values indicate the fuel has degraded or is contaminated and may be unsuitable for use. Laboratory testing is required to determine if this fuel is suitable for use. Acceptable changes from GBL values at base level are specified in other chapters of this manual. Specific use limits for FSII content, free water, fibers, and sediment are also indicated in other chapters.

2.8 STORAGE TANK AND PIPELINE MATERIALS/INFORMATION.

a. Acceptable JPTS Tank and Pipeline Materials: mild carbon steel with epoxy coating conforming to MIL-PRF-4556 and MIL-DTL-24441, stainless steel and aluminum.

b. Unsatisfactory Materials for JPTS:

1. Copper
2. Zinc
3. Silver
4. Uncoated Mild Carbon Steel
5. Magnesium
6. Bronze
7. Cast Iron
8. Tin

c. The tanks must have the capability to be pumped dry and isolated from each other by blind flange, removable spools, or double block and bleed valves. Tanks must be plumbed to allow fuel transfer between tanks.

d. Existing tankage must have contained similar product, JP-5, JP-8, kerosene, nonaromatic solvent, unleaded gasoline, or arctic diesel. The tank bottoms shall be completely free of water, scale, sediment and previous products. The discharge line will not be displaced by water unless directed by DET 3, WR-ALC/AFTH.

e. Epoxy coated tanks shall have a low point drain capable of removing all accumulated water from the tanks. Epoxy coatings must be intact with no evidence of peeling, cracking, or blistering.

f. Receiving and delivery lines must be dedicated and contain 100-mesh screens. Filter separators (new construction) conforming to API/IP Specification 1581 (current edition) must be installed on the tank's receipt and delivery lines. Provisions must be available for displacing the marine loading/unloading line to a tank other than the JPTS tanks.

g. The capability shall exist to take line samples under flow conditions during loading/unloading of marine conveyance.

CHAPTER 3
SAMPLING PROCEDURES

3.1 SAMPLING.

3.2 SAMPLING TECHNIQUES.

The sampling techniques specified herein will be strictly adhered to. The validity of test results on JP-7 and JPTS are greatly influenced by sampling procedures. The precautions required to assure that samples are representative of the fuel are dependent upon the container from which the sample is being obtained, the type and cleanliness of the sample container, and the sampling procedure. The basic principle of the procedure is to obtain a sample in such a manner that it will be truly representative of the product.

a. All samples submitted to the Base Fuels Laboratory, or to off-base laboratories, will be forwarded in approved sample containers. Sample containers will be stored in a locked room and will be used only for the purpose intended.

b. The currently approved sample containers are listed as follows:

   1. 5-gallon Can, NSN 8110-00-282-2520, UN1A1 Certified, Epoxy Lined with Cap and Seal

   2. 1-gallon Can, NSN 8110-01-371-8315, UN1A1 Certified, Epoxy Lined with Cap and Seal

c. Prepare sample cans for use by the following procedures:

   (1) Prior to use, soak the sample container for 24 hours with filtered fuel of the same grade to be sampled.

   (2) At the sample point fill each sample can approximately ½ full. Cap the container and shake thoroughly. Pour rinse fuel from the container into a clean fuel container draining as much fuel as possible.

   (3) Fill the sample container to the proper level assuring sufficient space exists in the container for thermal expansion.

   (4) Rinse fuel should be returned to bulk JP-7 or JPTS storage.

d. Glass bottles will be used to obtain samples for local flash point, API gravity, and FSII determinations.

e. Clean glass bottles will also be used to conduct the visual check for sediment and water from JP-7 and JPTS. Clean the glass bottles by using the following procedures:

   (1) Wash with strong soap and hot water solution.

   (2) Thoroughly rinse with tap water.

   (3) Rinse with distilled water.

   (4) Oven dry.

   (5) When dry, immediately cap the container.

   (6) Sample bottle caps should be cleaned similarly to bottles.

   (7) Always rinse bottle with product being sampled prior to filling bottle.

3.3 TYPES OF SAMPLES.

The type of samples taken depends on the particular tests required and the location being sampled. The following defines the various types of samples:

All-level Sample	A sample obtained by submerging a closed sampler to a point as near as possible to the draw-off level, then opening the sampler and raising it at a rate such that it is almost, but not quite, full as it emerges from the liquid.
Upper Sample	A sample obtained from the middle of upper third of the tank contents.
Middle Sample	A sample obtained from the middle of the tank contents.
Lower Sample	A sample obtained from the middle of the lower third of the tank contents.
Top Sample	A sample obtained 6 inches below the top surface of the tank contents.
Continuous Sample	A sample obtained from a transfer line conveying the product in such a manner as to give a representative average of the stream throughout the period of transit.
Tube or Thief Sample	A sample obtained with a sampling tube or thief from a specified point in the container.
Bottom Sample	A sample obtained from the contents on the bottom surface of the contents or at its lowest point.
Drain Sample	A sample obtained from the draw-off or discharge valve.

Multiple Tank Composite Sample	A blend of individual all-level samples, from each compartment or tank which contains the product being sampled, in proportion to the volume of material in each compartment.

NOTE

Drain and bottom samples are usually taken to check for water, sludge, or scale. A drain sample may be the same as a bottom sample, as in the case of a tank car. The tube sampling procedure may be used to obtain an all-level sample from a barrel or a drum.

3.4 SAMPLING PROCEDURES.

The following outlines general procedures to be followed in taking samples of JP-7 and JPTS:

a. Visually check all sampling equipment and containers for water, dirt, dust, or particles of lint. These must be spotless before they are considered acceptable for sampling.

b. Rinse sampling containers with JP-7 or JPTS prior to sampling except when checking for solids or fibers.

c. In storage tanks, the following three methods may be used to obtain samples:

(1) Continuous Sample – a continuous sample can be taken from a storage tank if provisions can be made to circulate fuel in the tank through a return line which contains a sample tap. Before fuel is circulated, drain the tank sump. If a hose is used in this circulation system, make sure that it has been well flushed with JP-7 fuel so that it does not contribute to contamination of the JP-7 fuel. After fuel has circulated through the line for approximately 2 minutes, open sample tap and drain at least 1 quart of fuel into a SCRAP bucket, then rinse sample container. Fill sample container with quantity desired. Do not fill sample container too rapidly, since the slower the fuel flows into the container, the more REPRESENTATIVE the sample. A continuous sample can also be taken with the in-line sampler by using the bypass line and flowing into the sample can.

(2) Composite Sample – this procedure may be used at locations where sample taps are installed externally on bulk storage tanks adjacent to the stairway or ladder. Depending upon the volume of fuel in the tank, equal volumes of fuel are taken from each tap so that their sum total will fill the sample container.

(3) All-level Sample – if a continuous or composite sample from a tank cannot be obtained, an ALL-LEVEL sample from the tank is suitable for complete or abbreviated local laboratory checks. This sample is taken by lowering a weighted stoppered bottle as shown in Figure 3-1 to a point as near as possible to the draw-off-level, uncorking it by a quick jerk and raising the sampler at such a rate that it is almost but not quite full as it emerges from the liquid. In taking sample for sediment content, do not use a narrow gauge hatch which extends into the tank. Sediment from this gauge hatch could contaminate the sample and produce erroneous readings. Sample may be transferred from sampler to the sample container by use of a funnel. This funnel must be cleaned and rinsed with the product prior to its use.

d. Samples from tank cars, tank trucks, and bulk fuel containers are to be taken from the tank bottom drain or manifold line after flushing of the line. Specific sampling instructions are contained in Paragraph 4.3.

e. Continuous samples are taken as product is transferred from vessel to tank, or tank to vehicle, etc. In taking this sample, a sample tap in the line is opened as the fuel is flowing. Flush the sampler and the sample container prior to filling the sample container. If the in-line sampler is used, flow of fuel can be directed either through the sampler or to a BYPASS which can be used to collect a continuous sample for laboratory testing.

f. Samples of water bottoms can be taken with a thief that extracts product from container bottoms or from a bottom drain. Such samples will be shipped to the laboratory in glass containers.

g. Samples from marine tankers are taken similarly to all-level samples taken from storage tanks. A closed sampler shall be submerged into each compartment to a point as near as possible to the draw-off level, open the sampler and raise at a rate such that it is nearly full as it emerges from the liquid.

h. Prepare composite samples by combining proportionate quantities of samples from various tanks or compartments into container(s).

i. Do not completely fill sample containers to be shipped to off-base laboratories. DO NOT use sealing wax, paraffin, or rubber gaskets to seal containers.

NOTE

Bulk tank acceptance samples from marine tanker receipts will be clearly indicated on the AFTO Form 475 Sample Tag as: Acceptance Sample from Marine Tanker Receipt.

3.5 MARKING AND IDENTIFYING SAMPLES.

Identify each sample immediately after sampling by securely attaching sample tag, AFTO Form 475, to the container. AFTO Form 475 will be completed by indicating sample number, date, manufacturer (supplier), batch number, source, and any other pertinent information.

3.6 ADDRESSES FOR SAMPLES.

All samples of fuels submitted for testing will be addressed as follows:

a. All JP-7 and JPTS samples from PACAF will be shipped to:

Aerospace Fuels Laboratory
OL DET 3, WR-ALC/AFTLG
Bldg 854
Kadena AFB Japan
APO AP 96368-5162

EXCEPTION: Samples in Korea go to:

Defense Energy Support Center
Petroleum Laboratory – Pyongtaek
APO AP 96218-02666

b. All JP-7 and JPTS samples from USAFE will be submitted to:

Aerospace Fuels Laboratory
Unit 5025
OL DET 3, WR-ALC/AFTLF
Bldg 725
RAF Mildenhall UK
APO AE 09459

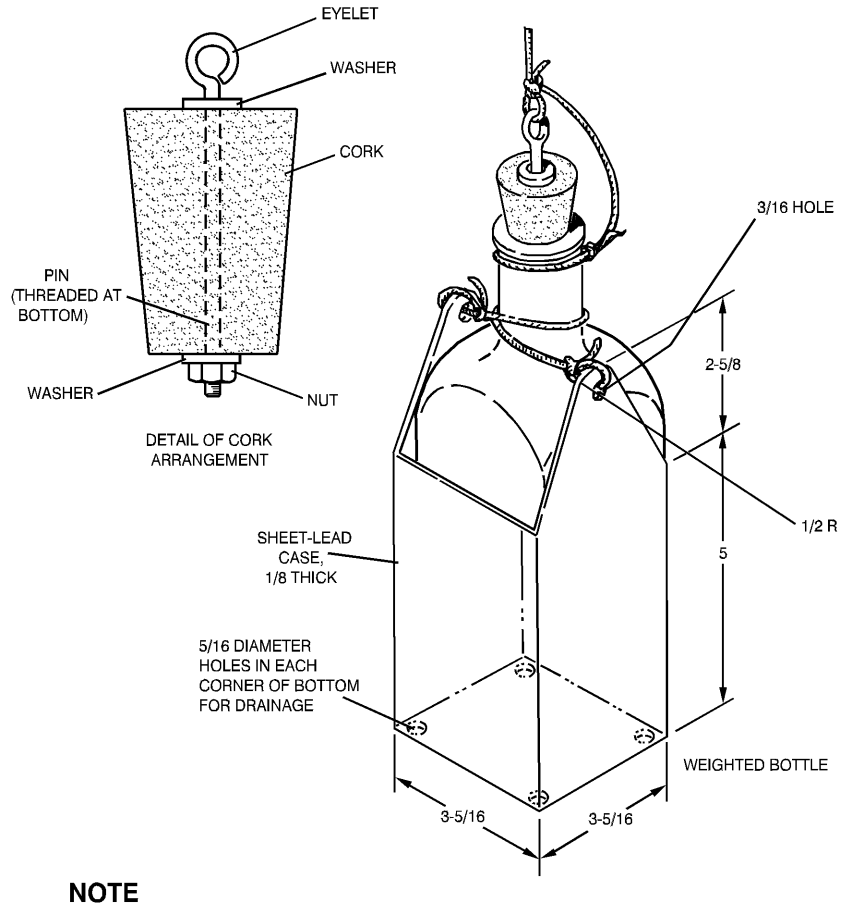
c. All other locations will submit JP-7/JPTS samples to the appropriate area Aerospace Fuels Laboratories in accordance with T.O. 42B-1-1. Aerospace Fuels Laboratories will analyze fuel samples in accordance with MIL-DTL-38219, Table I for JP-7 and MIL-DTL-25524, Table I for JPTS.

NOTE

Chapter 4 through Chapter 7 applies to JP-7 fuel; however, many of the requirements specified in these chapters also apply to JPTS fuel.

NOTE

ALL DIMENSIONS ARE IN INCHES.



NOTE

THIS BOTTLE TO BE USED FOR OBTAINING THE INDIVIDUAL SAMPLES WHEN INDIVIDUAL SAMPLES ARE TO BE KEPT SEPARATE, THAT IS, WHENEVER THE SAMPLE MUST BE DELIVERED TO THE LABORATORY IN THE SASME CONTAINER WHICH IT WAS CONTAINED.

Figure 3-1. Sampler for JP-7/JPTS

CHAPTER 4
PRODUCT RECEIPT

4.1 RECEIPT.

4.2 RECEIPT OF FUEL.

JP-7 and JPTS fuel may be received by one of these modes: railroad tank car, tank truck, and bulk fuel container, or marine vessel. Upon receipt, examine each transportation conveyance to assure that the grade of fuel, quantity, and serial numbers of the seals agree with the shipping document. If shipment is received with seals broken or missing, contact DET 3, WR-ALC/AFTH and await instructions before unloading shipment. Check the shipping and receiving documents accompanying each shipment for contract number, product specification, product nomenclature, seal numbers, lot or batch number. DD Form 250 will be received by mail prior to arrival of tank car. DD Form 250 will accompany tank truck and bulk fuel container shipments. On marine movements, the DD Form 250-1 will accompany the vessel.

4.3 SAMPLING OF TRANSPORT MODE.

a. Tank Car, Tank Truck, or Bulk Fuel Container – prior to unloading, the bottom sump of each tank car, tank truck, and bulk fuel container shall be drained into a scrap bucket until only clear product comes from the drain. Normally, 5 – 10 gallons of fuel drained from sump is sufficient to remove residual water and sediment. If product is not clear after draining 50 gallons, stop draining, and contact DET 3, WR-ALC/AFTH for instructions. If satisfactory, a drain sample will be taken from each unit sump in a clean 1-quart or 1-liter glass bottle and inspected in accordance with the visual inspection procedures. Repeat this procedure if the visual sample is unsatisfactory. If the resample is unsatisfactory, contact DET 3, WR-ALC/AFTH for instructions. If the visual sample is satisfactory, analyze the sample in the laboratory in accordance with Table 6-1, JP-7 and JPTS Fuel Sampling Requirements and Test Limits.

b. Marine Tanker – at destination an all-level sample will be taken from each compartment on the tanker containing JP-7 or JPTS. Conduct the following tests on each sample: flash, visual, and API gravity.

(1) Ullage all ship tanks containing cargo and compare with shipping document. An increase in ullage should be considered suspect. A slight increase in volume caused by increase in temperature should be considered in the evaluation. The trim or draft of the tanker should also be considered if there are volume differences.

(2) Examine ship valve seals and line blinds to assure that no changes have been made which will compromise isolation of the JP-7 and JPTS system.

(3) Examine ship's pump room. The practice is to isolate one pump at origin. Assure that blinds and seals have not been changed.

(4) In the event that the cargo pump which was isolated at origin malfunctions before or during off-loading, an alternate pump must be prepared and examined as follows:

(a) All strainers must be drained, opened, and cleaned.

(b) Lines to pump will be blanked.

(c) Pump system and accompanying lines will be flushed with fresh water, and all water drained from the system.

(d) Flush line and pump with JP-7 and JPTS back to an empty ship's tank. A minimum flush of 100 barrels of JP-7 and JPTS will be required.

(e) If there is no empty ship's tank, the line flush may be blended into any slack ship's tank that is in JP-8 service.

(f) As the second alternative, the line flush will be directed to a shore slop tank. Transfer 100 barrels more than the combined volume of ship and shore line.

(g) If the ship's internal flushing procedure is used, a quart sample will be taken at start of discharge at a location as close as possible to the ship's discharge manifold line. This sample will be taken immediately after the ship's discharge manifold line is cleared. If the line flush is directed to a shore slop tank, the 1-quart sample will be taken under flow conditions approximately 2 minutes before completion of transferring into slop tank. Sample will be taken at a location immediately upstream of the slop tank.

(h) After sampling, shut down transfer and perform lab testing in accordance with Table 6-1, JP-7 and JPTS Fuel Sampling Requirement and Test Limits. Should the sample fail any tests, terminate the receipt and follow instructions in Paragraph 4.4.

4.4 SAMPLE FAILURE.

When sample results show the tanker fails any of the limits in Table 6-1, Rule 2b, do not off-load the fuel. Contact the applicable Major Command, HQ 8AF/LGSF, and DET 3, WR-ALC/AFTH by message or electronic mail with the following information: amount of fuel onboard the vessel that is on quality hold, lab test results, type of transport vessel, shipment and contract number.

4.5 RECEIVING FUEL INTO STORAGE.

a. New product will not be received into storage tanks which contain JP-7 and JPTS in hold status.

b. Mixing of new receipts with approved fuel in the receiving tanks is permitted when the following conditions are met: product in storage has passed complete specification tests (as specified in Paragraph 3.4, Step c) within the previous 6 months, and satisfactory flash point and API gravity results are obtained on an all-level sample taken immediately prior to receipt.

c. Samples – conduct sampling for all JP-7 and JPTS received, handled, and issued in accordance with Table 6-1, JP-7 and JPTS Fuel Sampling Requirements and Test Limits.

d. When product receipt is completed, lock all valves on the receiving tank.

4.6 ISSUES FROM BULK STORAGE.

All JP-7 and JPTS storage tanks shall be drained of water and sediment daily prior to first use. All valves on JP-7 and JPTS storage tanks must be locked until tank is placed on issue. Product must have been approved for use by an area laboratory before it can be used, and it must be issued on a first-in, first-out basis.

4.7 MAINTENANCE AND INSPECTION OF SYSTEMS.

Maintenance and inspection of systems will be accomplished in accordance with UFC 3-460-03, and applicable technical orders, except as specified below.

a. In addition to time and pressure differential pressure change criteria specified in UFC 3-460-03 for fixed filter separators, filters will be changed when downstream samples exceed the color and particle assessment limits as per Table 6-1, JP-7 and JPTS Fuel Sampling Requirements and Test Limits.

b. Storage tanks and pipelines shall be marked in accordance with MIL-STD-161, Identification Methods for Bulk Petroleum Systems Including Hydrocarbon Missile Fuels.

4.8 DRUM STORAGE.

Drums will be placed horizontally (on sides) in double rows, butt-to-butt, with bungs and vents facing outward. Bungs and vents will be positioned horizontally. Drums should not be stacked more than three high. Drums stored outside will be positioned as above and placed on dunnage (off the ground) with proper blocking and bracing as necessary.

a. Drum Receipts – drums do not require sampling prior to off-loading. For drum receipts, assure the quantity agrees with the shipping document. Drums will be checked for leaks, and those found defective will be segregated for determination of usability. Drums will be stored by batch, and issued on a first-in, first-out basis.

b. Drum Samples – on drum receipts, submission of samples to the area lab is not required unless more than 6 months have elapsed since last area laboratory testing. If area lab samples are required, select one drum at random from each batch received. Submit a 2-gallon sample from each drum selected to the area lab for specification analysis (Paragraph 3.6). During sampling, visually inspect interior of each drum with flashlight for presence of free water, rust, suspended solids, and evidence of other contamination. Note the results of visual inspection on reverse of AFTO Form 475. Also from each drum sampled, take base level sample and test for flash point, API gravity, color, and FSII content. Values from these tests should meet limits cited in Table 6-1. Report contamination detected from visual inspection of drums, and deviation from acceptable limits for base level test, by message to: HQ 8AF/LGSF, applicable MAJCOM, and DET 3, WR-ALC/AFTH. Place any suspect batch in QC hold status pending further instructions. Close and reseal the drums and stencil the sample date (Julian) on top of the drum.

c. On drum receipt from other Air Force activities, take a quart sample from one drum, from each batch received and perform testing in accordance with Table 6-1.

4.9 DRUM ISSUES TO REFUELERS.

Redrummed product will be used first. Prior to issuing from a drum batch or redrummed product, five drums from each 100 drums in the batch will be visually inspected for water, sediment, and any other indication of contamination. If there are less than 100 drums, the minimum number of drums to be inspected is five. Visual inspection will be performed by shining a flashlight through the bunghole. If results are satisfactory, the batch requires no further visual inspection before issue. If any of the drums from a batch are found to be contaminated, those drums will not be used, and 100% visual inspection is required on the remaining

drums in that batch before use. Fuel transferred from drums to refueling units must pass through a filter separator. This may be accomplished by use of a PMU-27, R-14, another refueler, or any other type of equipment available that contains a filter separator. Once each 7 days during transfer from drums to refueling units, a 1-gallon in-line sample, a free water sample, and a quart sample will be taken downstream of the filter separator on the transfer filtration equipment. Test limits outlined in Table 6-1, Rule 7a apply.

4.10 REDRUMMING.

Product Remaining in Refuelers – refuelers that must be emptied of JPTS after servicing aircraft, and the fuel cannot be returned to bulk storage, will be redrummed. Drums in previous JPTS service will first be inspected internally to assure they are clean and dry. When filled, they will be resealed. From one drum, take a 1-quart sample and perform: flash, color, gravity, and FSII. Results must meet limits of Table 6-1, Rule 6d and will be the new batch acceptance results. Remove or cover all previous sampling and batch identification and reestablish their identity by applying a new batch number to the drums. The batch number will consist of the base identification, the Julian date that the product was redrummed, and the original batch numbers of the drummed product. Example: Batch number Davis-Monthan 5141 - 67/72. This identification shows that the fuel was redrummed by Davis-Monthan AFB on May 21, 2005, and is a mixture of batches 67 and 72. Resampling date for area laboratory analysis is 6 months from the date of redrumming. Leaking Drums – product in leaking drums will be redrummed if visual inspection indicates a satisfactory fuel.

CHAPTER 5
MOBILE OPERATIONS

5.1 MOBILE OPERATIONS.

5.2 MAINTENANCE OF EQUIPMENT.

a. The Refueling Maintenance Element, Logistics Readiness Squadron, is responsible to ensure:

(1) Periodic inspections are effectively performed.

(2) Master meters are drained of product and flushed prior to calibration of JP-7 and JPTS servicing unit meters.

(3) Swing joints and hose reel seals are lubricated with approved lubricants in accordance with appropriate vehicle technical order.

(4) Only teflon is used on threaded fittings as sealant.

(5) New hoses are properly installed, inspected and hydrostatically tested in accordance with T.O. 37A-1-101 and T.O. 36-1-191. Hoses will be soaked and flushed in accordance with Paragraph 5.7.

(6) F/S elements are changed in accordance with T.O. 37A-1-101.

b. Fuels Management Flight Commander is responsible to ensure:

(1) Units due for inspection are removed from service.

(2) All units returning from maintenance have been properly tested by Laboratory personnel prior to use.

(3) All new equipment brought into JP-7 and JPTS service is properly marked, flushed, and sampled prior to use.

5.3 OPERATOR RESPONSIBILITY.

The most meaningful samples are those taken directly from the fueling nozzles during full flow. Only fully qualified personnel will be allowed to handle JP-7 and JPTS fuel or servicing equipment. The operator will be responsible to ensure that:

a. Only clean, dry fuel is issued.

b. Tank and filter/separator sumps have been properly drained daily.

c. Sampling and testing of samples are performed as specified in Table 6-1.

d. Daily inspection is made of all JP-7 and JPTS servicing equipment.

5.4 LEAKS AT REFUELING NOZZLES DURING SERVICING.

During servicing of aircraft, small leaks at the refueling nozzle may occur. Any leak in excess of 60 drops per minute will be considered cause to terminate refueling operations and inspect equipment.

5.5 SERVICING IN SHELTERS.

Servicing prime aircraft in sheltered areas can be conducted. The following conditions shall be strictly adhered to:

a. All shelter doors must be opened to permit quick exit by servicing equipment.

b. All servicing equipment will be positioned facing the exit.

c. The entire length of servicing hose will be used to keep the unit as far as possible from the aircraft and as close to the exit as possible.

d. Sufficient fire extinguishers must be available and in place.

e. Aircraft and unit will be properly grounded/bonded and positioned in accordance with T.O. 00-25-172.

5.6 CONVERSION OF REFUELING UNITS FROM JP-5/8 TO JP-7 OR JPTS SERVICE.

a. Drain tank, filter housing, meters, lines, and hoses of all previous product. It is important to drain all components thoroughly and have the refueling unit as dry as possible.

b. Transfer 1,000 gallons of JP-7 or JPTS into the unit and circulate through both hoses until 1,000 gallons are shown on each meter. Continue circulation and obtain an in-line sediment sample, AEL water sample, and a 1-quart sample to analyze for flash point, API gravity, and FSII content.

c. If the sample test results meet the limits indicated in Table 6-1, the unit may be filled and normal servicing may begin.

d. If sample test results do not meet the limits indicated in Table 6-1, downgrade product. Product will be blended with one part JP-7 to four parts JP-8, or one part JPTS to one part JP-8.

5.7 SOAKING, FLUSHING, AND SAMPLING NEWLY INSTALLED HOSES.

At time of installation, JP-7 and JPTS dispensing hoses will be soaked and flushed as follows:

a. Pressurize the hose on the refueler with fuel and soak for at least 10 hours.

b. Discard fuel in hose into a suitable container.

c. Flush the hose with at least 500 gallons of fuel by circulating through the bottom loader.

d. Remove the nozzle strainer and check for contaminants (solids, rubber, fabric, etc.). If excessive contaminants are found, flush an additional 500 gallons of fuel through hose and reinspect nozzle strainer. If contaminants are still excessive, return the vehicle-to-vehicle maintenance and replace hose.

e. If the hose passes the nozzle strainer check, take a 1-gallon in-line sample from the nozzle under flow conditions and analyze for color and particle. Color will not exceed A1, B1, or G1 and particle rating must be acceptable.

f. If either the color or particle assessment fails, resample using the matched weight or bottle method. The result must be 2.0 mg/gl or less. If resample fails, return the vehicle-to-vehicle maintenance and replace hose.

5.8 SAMPLING AND TESTING HOSES THAT HAVE BEEN HYDROSTATIC TESTED.

Hoses that have been hydrostatic tested (for scheduled maintenance or repair) will be flushed, sampled, and tested in accordance with Paragraph 5.7, Step c and Paragraph 5.7, Step d. If the hose passes the nozzle check, it is suitable for use.

CHAPTER 6
SAMPLING REQUIREMENTS FOR SERVICING, FLUSHING, AND DEFUELING AIRCRAFT

6.1 SAMPLING REQUIREMENTS FOR SERVICING, FLUSHING, AND DEFUELING AIRCRAFT.

NOTE

JP-7 and JPTS must pass through two separate filter separators prior to being issued to aircraft.

6.2 SERVICING OF AIRCRAFT.

Aircraft will be serviced by refueling unit or hydrant servicing equipment.

a. Refueling Units and Hose Carts – refueling units and hose carts used for servicing aircraft will be sampled once weekly in accordance with Table 6-1, JP-7 and JPTS Fuel Sampling Requirements and Test Limits. Equipment returning from maintenance that could have possibly affected the fuel or fuel delivery system will require sampling prior to returning to service.

b. If any of the tests preformed fail, an investigation and corrective action should be performed before further servicing. Contact the applicable MAJCOM, 8AF/LGSF, and DET 3, WR-ALC/AFTH immediately if aircraft servicing is suspended.

6.3 SAMPLING OF SUPPORT AIRCRAFT.

Sump sampling of support aircraft tanks is necessary to determine that fuel in the tanks is satisfactory. This is accomplished by laboratory comparison of samples taken prior to servicing with samples taken from the aircraft tank sumps. These samples will be taken by aircraft maintenance personnel. They will be processed in the fuels laboratory and test results forwarded to aircraft personnel. Tanker aircraft normally have two fuel servicing manifolds, one for JP-8 and one for JP-7/JPTS. These manifolds are interconnected and are separated by one valve. If this valve should leak, JP-8 fuel could leak into the JP-7/JPTS fuel tanks, which would result in chemical contamination of the JP-7/JPTS. In addition, the IFR pumps are located in the JP-7/JPTS fuel tanks and are hydraulically operated. Dry or deteriorated seals in the pumps could allow fluid to leak into the JP-7/JPTS fuel.

6.4 TANKER AIRCRAFT.

Aircraft that require sampling are placed in three categories: scheduled flyers, strip alert, and ground spares.

a. Sampling of Tanker Aircraft – tankers with JP-7/JPTS onboard will be sampled for fuel quality in accordance with Table 6-1, Rule 9.

b. The Base Fuels Laboratory will provide sample results to the aircrew at least 1 hour prior to flight time. Results will be valid for 6 hours after samples were taken. If the aircraft has not flown for 6 hours the aircraft must be resampled.

6.5 SAMPLING OF PRIME AIRCRAFT.

Prime aircraft do not require sump sampling prior to flight unless specifically requested, or the refuel sample is suspect.

6.6 PURGING AND FLUSHING OF TANKER AIRCRAFT.

When it is necessary to convert In-Flight Refueling (IFR) tanks from JP-8 to JP-7 service, all JP-8 is drained from the tanks and flushed with JP-7 fuel. Normally, it requires two or three flushings before all JP-8 is effectively removed from the tanks. The boom must also be purged of all JP-8 product.

a. Equipment and Personnel Required.

(1) One laboratory technician.

(2) One JP-7 or JPTS refuel unit with required amount of fuel and unit operator.

(3) One empty JP-8 defuel unit and operator.

(4) The responsible aircraft organization will furnish one hose fitted with a coupling to accommodate the bottom loading receptacle on the defuel unit. The responsible aircraft organization that maintains the hose will assure it receives proper hydrostatic testing. They will also provide supervisory and other personnel required to assist in making necessary connections.

b. Safety Precautions – this operation will be considered abnormal and strict compliance with the following procedures is mandatory.

(1) A fully-manned fire truck (foam type) will stand by during the entire operation.

(2) All checklist (T.O. 1C-135(K)Q-2GA-1) procedures will be completed by aircraft flush unit operator, JP-7/JPTS refueling unit operator, and aircraft fueling team supervisor prior to beginning this operation.

(3) The aircraft and fuel units will be grounded/bonded in accordance with T.O. 00-25-172.

(4) The aircraft engine used will be the one furthest removed from the fuel servicing unit.

(5) After aircraft has been flushed, drained, and partially uploaded in accordance with T.O. 1C-135(K)Q-2GA-1, the aircraft refueling supervisor will sign and submit to the base fuels laboratory personnel documentation with the following information: date, location, aircraft number, tanks flushed, and the total gallons uploaded in each tank after flushing. The laboratory technician will conduct visual and flash tests on sump samples to determine acceptability of product. If tests are unsatisfactory, flushing must be repeated. If the flash point and visual tests are satisfactory, the remaining QC tests will be run. If all tests show that fuel is satisfactory, the aircraft will be serviced with the required fuel load.

c. Tests and Samples Required – each refueler used for servicing will have been sampled and tested in accordance with Paragraph 6.2. After complete refueling, a 1-quart sample will be taken from the sump of each aircraft tank. The aircraft sump samples will be analyzed in the laboratory for flash and API. Interpret results as follows:

(1) Flash – the flash shall not be below 140°F for JP-7, 110°F for JPTS, and shall differ no more than ±6°F from each refuel unit that was tested prior to servicing.

(2) API Gravity – the API gravity @ 60°F for JP-7 shall be between 44.0° and 50.0°, for JPTS it shall be between 46.0° and 53.0°.

d. Sample results will be documented and delivered to the aircraft refueling supervisor. Test results will also be forwarded to the Resource Control Center (RCC). All tests performed will be recorded by the laboratory technician.

e. Disposition of Flushed Fuel – fuel contained in the flush unit shall be downgraded to JP-8 immediately after the operation.

6.7 DEFUELING AIRCRAFT.

Normal defueling of primary and tanker support aircraft due to load change, mission cancellation, or required maintenance may be accomplished by hydrant rapid defueling using a MH2 series hose cart or refueling unit.

a. Rapid defueling of aircraft into a truck will be accomplished by using a double hookup single-point nozzle defuel hose. One end of the hose is connected to the aircraft receptacle and the other to the unit bottom loader.

b. The following conditions shall be strictly adhered to:

(1) For rapid defueling of support aircraft by truck, a fully-manned fire truck (foam type) will stand by.

(2) The defueling unit shall be empty or have sufficient ullage to hold the defuel.

(3) All safety precautions outlined in T.O. 00-25-172 will be strictly adhered to.

6.8 DISPOSITION OF DEFUELED PRODUCT.

Defueled product will be handled by one of the following methods:

a. Product remaining in prime aircraft following flight need not be removed unless required for maintenance. Fuel remaining in, or defueled from prime aircraft into refueling units, may be used unless fuel quality is suspect.

b. Defueled product from support aircraft flushing operations will be downgraded immediately.

c. Defueled product from support aircraft shall be returned to defuel storage if the API gravity agrees within ±1.0, flash point within ±6°F of results obtained when the aircraft was initially loaded. Visual examination of the sample will indicate no water or sediment.

d. Defueled product from support aircraft, which does not meet either flash point or API gravity limits of Step c, will be blended at a ratio of one part JP-7 to four parts JP-8, or one part JPTS to one part JP-8.

e. Defueled product in defuel storage should be allowed to accumulate until the tank is full. When tank is full, obtain an all-level sample and analyze for API gravity, flash, and FSII. A composite sample may be taken from external sample taps if installed on above ground defuel tanks. To be acceptable for use, results must be as follows:

(1) Corrected API gravity – between 44.0° and 50.0° for JP-7 and between 46.0° and 53.0° for JPTS.

(2) Flash – not less than 140°F for JP-7 and 110°F for JPTS.

(3) FSII – 0.07 – 0.20%.

f. If the fuel fails any of the above requirements (except FSII), place the tank in hold status and submit a 2-gallon sample to the appropriate area laboratory for analysis (Paragraph 3.6). Fuel outside FSII limits will be upgraded before use. Contact DET 3, WR-ALC/AFTH, Wright-Patterson AFB, OH for upgrading/downgrading instructions.

6.9 SAMPLING JP-7/JPTS TRANSFERRED DIRECTLY FROM TANKER AIRCRAFT (KC-135Q) TO TANKER AIRCRAFT (KC-135Q) AND/OR PRIMARY AIRCRAFT DURING GROUND OPERATIONS.

Sump sampling of tanker aircraft is necessary to determine that fuel in the tanks is satisfactory for use prior to transfer. This is accomplished by laboratory comparison of samples taken prior to flight with samples taken from the aircraft tank sumps.

a. Sump samples will be taken from the forward, aft, and upper deck tanks of a tanker aircraft carrying JP-7/JPTS if used to ground transfer fuel to another tanker aircraft and/or to a primary aircraft. Samples will be tested for API gravity, flash, color, and visual appearance.

b. Test Limits.

(1) API Gravity – API gravity @ 60°F for JP-7 shall be between 44.0° and 50.0°, for JPTS it shall be 46.0° – 53.0°, and for both JP-7 and JPTS the API shall not vary more than ±0.5° of fuel API when originally issued prior to flight.

(2) Flash – the flash point shall not fall below 140°F for JP-7 and 110°F for JPTS and shall not differ more than ±6°F of flash point of fuel issued to aircraft prior to flight.

(3) Visual – the visual sample shall be clear and bright, with no evidence of sediment or free water.

6.10 PURGING AND FLUSHING OF KC-10 AIRCRAFT.

When it is necessary to convert In-Flight Refueling (IFR) tanks from JP-8 to JP-7/JPTS service, all JP-8 is drained or transferred from the tanks and tanks flushed with JP-7/JPTS fuel. The boom must also be purged of all JP-8 product.

a. Equipment and Personnel Required.

1. One Laboratory Technician

2. One JP-7/JPTS Refuel Unit with Required Amount of Fuel and Unit Operator

3. One Empty JP-8 Defuel Unit and Operator, if Required

b. Safety Precautions.

(1) All checklist (T.O. 1C-10(K)A-2-12CL-1) procedures will be completed by the JP-7/JPTS refueling/JP-8 defueling unit operator and aircraft fueling team supervisor prior to beginning this operation.

(2) The aircraft and fuel units will be grounded/bonded in accordance with T.O. 00-25-172.

(3) After the aircraft has been drained and flushed and partially uploaded in accordance with T.O. 1C-10(K)A-2-12CL-1, the laboratory technician will conduct visual and flash tests on sump samples to determine acceptability of product. If tests are unsatisfactory, flushing will be repeated. If tests show that fuel is satisfactory, the aircraft will be serviced with the required fuel load.

c. Tests and Samples Required – each refueler used for servicing will have been sampled and tested in accordance with Paragraph 6.2. After complete refueling, a 1 quart sample will be taken from the sump of each aircraft tank. The aircraft sump samples will be analyzed in the laboratory for flash, color, and API. Interpret results as follows:

(1) Flash – the flash point shall not fall below 140°F for JP-7 and 110°F for JPTS and shall not differ more than ±6°F from refuel unit that was tested prior to servicing.

(2) API Gravity – API gravity @ 60°F for JP-7 shall be between 44.0° and 50.0°, for JPTS it shall be between 46.0° and 53.0°.

d. The Base Fuels Laboratory technician shall provide a hard copy of fuel sample results to the aircrew.

e. Disposition of Flushed Fuel – fuel contained in the flush unit shall be downgraded to JP-8 immediately after the operation.

6.11 SAMPLING JP-7/JPTS TRANSFERRED DIRECTLY FROM KC-10 AIRCRAFT TO ANOTHER AIRCRAFT/STORAGE AREA DURING GROUND OPERATION.

Sump samples will be taken from the forward, center wing, and aft body tanks of KC-10 aircraft carrying JP-7/JPTS if used to ground transfer fuel to another aircraft/storage unit. Sump sampling of KC-10 aircraft is necessary to determine that the fuel in the tanks is satisfactory for use prior to transfer. This is accomplished by laboratory comparison of samples taken prior to flight as recorded with samples taken from the aircraft tank sumps.

6.12 DEFUELING KC-10 AIRCRAFT.

Normal defueling of the KC-10 aircraft due to load change, mission cancellation, or required maintenance will be accomplished in accordance with T.O. 1C-10(K)A-2-12CL-1.

6.13 SERVICING TANKER AIRCRAFT FROM ANOTHER LOCATION WITH JP-7/JPTS ONBOARD.

When tanker aircraft arrive from another location with JP-7/JPTS onboard and requires refueling with JP-7/JPTS, the following procedures will apply:

a. Sample the JP-7/JPTS on the aircraft for the following tests and limits:

(1) The API gravity shall not differ more than ±1° from value recorded during last aircraft refuel.

(2) The flash point shall not differ more than ±6° from value recorded during last aircraft refuel.

b. If the above samples do not meet the prescribed limits, do not refuel the the aircraft. Defuel the aircraft and flush the JP-7/JPTS tanks in accordance with Paragraph 6.6.

c. If the samples from JP-7/JPTS onboard the aircraft meet the prescribed limits, refuel the aircraft and sample the JP-7/JPTS tanks in accordance with Paragraph 6.4, Steps a and b. Samples must meet limits outlined in Table 6-1, Rule 9a.

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
1.	Tank Truck/Tank Car/Bulk Fuel Container Receipts.				
1a.	Receipt vessel drain valve (1-quart sample into a clear glass jar).	Visual. After visual passes, take the 1-quart sample to the lab and analyze for:	Repeat test until results are clear and bright with no visible water or solids.		Prior to discharge of every tank truck, tank car, and bulk fuel container received.
		Flash	140°F min and ±6°F of GBL	110°F min and ±6°F of GBL	
		API gravity	44.0° – 50.0° and ±0.5° of GBL	46.0° – 53.0° and ±0.5° of GBL	
1b.	Downstream of receipt filter separator.	Color and particle assessment.	Not to exceed color rating of A2, B2, or G2 and must meet acceptable particle rating.	Not to exceed color rating of A2, B2, or G2 and must meet acceptable particle rating.	Every receipt, 10 minutes after line displacement, each series manifolded for simultaneous offload.
		Free water	20 ppm	20 ppm	
2.	Tanker/Barge Receipts.				
2a.	Gauge for water and take all-level samples from each cargo tank.	Water finding paste.	NIL		Prior to discharge.

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits - Continued

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
		Visual for color, water, and solids.	Clear and bright with no visible water or solids.		
2b.	Create two 1-gallon composites (from all-level samples).	On one of the composites test:			Prior to discharge.
		Flash point	140°F min and ±6°F of GBL	110°F min and ±6°F of GBL	Retain second composite pending receipt tank results.
		API gravity	44.0° – 50.0° and ±0.5° of GBL	46.0° – 53.0° and ±0.5° of GBL	
		If sample fails, submit retain to area lab for B1 w/JFTOT testing.			
2c.	During vessel discharge (downstream of receipt filter separator).	Color & particle assessment. If color fails or if any particulate is visible on the membrane perform a bottle method (max allowable is 0.5 mg/L). If bottle method fails, initiate filter change and issue PQDR.	Shall not exceed A2, B2, or G2 and must meet acceptable particle rating.	Shall not exceed A2, B2, or G2 and must meet acceptable particle rating.	Five minutes after the shoreline has been displaced. Also at midpoint and 1 hour prior to completion.
		Water (In the event of failure, resample. If resample fails, investigate cause prior to resuming off-load.)	20 ppm max	Clear & bright (by visual analysis)	
3.	Storage Tanks.				
3a.	Receipt tank samples. Take a 1-quart and two 1-gallon all-level samples from receipt tank (submit the 2 gallons to the area lab for B-1 with JFTOT analysis).	Analyze the 1-quart sample for:			After minimum of 12 hours settling time after receipt of new product into bulk tank. (Tanks sampled remain on hold pending area lab results.)
		Water/sediment	Clear & bright	Clear & bright	
		Flash point	140°F min	110°F min	
		API gravity	44.0° – 50.0°	46.0° – 53.0°	
		FSII	0.10 – 0.15%	0.10 – 0.15%	

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits - Continued

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
3b.	Dormant tank sample (stock is considered dormant if it has remained in storage and has not turned over at least two-thirds of contents in a 6-month period).	Submit a 2-gallon sample (composite from all-level samples) to the assigned area lab for B-2 testing.	Lab will report results as compared to produce specification – product to be placed on quality hold pending area lab results.		Every 180 days.
4.	Inactive Storage Tank Issue Lines.				
	Inactive storage system issue lines. After line displacement pull a 1-gallon and 1-quart sample downstream of filter separator using an in-line sampler.	Perform a color and particle assessment on the 1-gallon sample. Analyze the 1-quart sample for flash, gravity, and FSII.	Color not to exceed A1, B1, or G1 and must meet acceptable particle rating. 140°F min 44.0° – 50.0° 0.07 – 0.20%	Color not to exceed A2, B2 or G2 and must meet acceptable particle rating. 110°F min 46.0° – 53.0° 0.07 – 0.20%	Storage system issue lines inactive for 30 days or longer. If the inactive line is displaced by issuing fuel to an in-service refueling unit the fuel can be issued or returned to bulk after test results show product passes all tests.
5.	Hydrant System and Fillstands.				
5a.	Downstream of filter separator during transfers from bulk tanks to hydrant tanks. Perform a color and particle assessment and water onsite and take a 1-quart sample to the fuels lab to analyze for flash, gravity, & FSII.	Color & particle assessment (rate membrane on the spot). Free water Flash API gravity @ 60°F FSII	Not to exceed A1, B1, or G1 and must meet acceptable particle rating. 5 ppm 140°F min & within 6°F of bulk tank 44.0° – 50.0° ±0.5° of bulk tank 0.07 – 0.20%	Not to exceed A2, B2, or G2 and must meet acceptable particle rating. 5 ppm 110°F min & within 6°F of bulk tank 46.0° – 53.0° ±0.5° of bulk tank 0.07 – 0.20%	Each transfer into hydrant tanks from bulk storage. Sample to be taken immediately after line displacement.
5b.	Downstream of hydrant filter separators.	Color & particle assessment. Free water	Color not to exceed A1, B1, or G1 and must meet acceptable particle rating. 5 ppm	Color not to exceed A2, B2, or G2 and must meet acceptable particle rating. 5 ppm	Every 30 days from active filter separators; upon first use for separators inactive for longer than 30 days; and prior to first use after each filter change.

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits - Continued

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
5c.	Truck fillstands, downstream of filter separators.	Color & particle assessment (if initial test fails recheck, 2nd failure constitutes filter change &investigation).	Color not to exceed A1, B1, or G1 and must meet acceptable particle rating.	Color not to exceed A2, B2, or G2 and must meet acceptable particle rating.	Weekly. If fillstand is inactive for more than a week sample it during first refueler fill.
		Free water	5 ppm	5 ppm	
		Flash	140°F min & within 6°F of issue tank	110°F min & within 6°F of issue tank	
		API gravity @ 60°F	44.0° – 50.0° ±0.5° of issue tank	46.0° – 53.0° ±0.5° of issue tank	
		FSII	0.07 – 0.20%	0.07 – 0.20%	
6.	Drummed Product.				
6a.	Drum Receipts:				
	Drums Received Directly from Supplier.	No sampling requirements.	N/A	N/A	Prior to off-load.
	Drums Received via Intragovernmental Transfers (using drum thief pull a 1-quart sample from one drum from each batch received).	Flash	140°F min	110°F min	Upon receipt.
		API gravity @ 60°F	44.0° – 50.0°	46.0° – 53.0°	
		FSII	0.07 – 0.20%	0.07 – 0.20%	
6b.	Drum issues to aircraft: five drums from each 100 drum batch (if batch is <100 drums sample at least five drums from each batch). NOTE - Drummed fuel must be passed through a filter separator prior to issue to aircraft.	Free water test via water finding paste.	NIL		Prior to issuing from each batch.
		Visual for water & solids using drum thief and clear 1-quart jar.	NIL		
6c.	Downstream of filter separators on drum transfer/issue lines.	Free water	5 ppm		Every 7 days.
		Color & particle	Not to exceed A1, B1, or G1 and must meet acceptable particle rating.		
		FSII	0.07 – 0.20%		

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits - Continued

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
6d.	Redrummed Product: one drum from redrummed lot. (Drums in previous JP-7 or JPTS service will be internally inspected prior to filling to assure they are clean & dry.)	Flash API gravity @ 60°F FSII	140°F min 44.0° – 50.0° 0.07 – 0.20%	110°F min 46.0° – 53.0° 0.07 – 0.20%	Immediately after redrumming, randomly select one drum from redrummed lot – stencil original batch number and date redrummed/sampled on the drum.
6e.	Dormant Drums: randomly selected drum from each batch.	Visual Two gallons to area lab.	C & B Request area lab perform B-1 w/JFTOT analysis.		Every 180 days – stencil sample date on drum.
7.	Refueling Units/Hose Carts.				
7a.	Downstream of refueling unit/hose cart filter separators (to be sampled during recirculation prior to issue).	Free water Color & particle FSII	5 ppm Not to exceed A1, B1, or G1 and must meet acceptable particle rating. 0.07 – 0.20%		Every 7 days and whenever filters are changed (when performing test after filter change rotate 2,000 gallons through the unit first).
7b.	One refueler/hose cart from fleet. Rotate weekly so entire fleet gets sampled before another cycle is started (sample via internal recirculation).	Flash API gravity @ 60°F	140°F min & within 6°F of issue tank/drums 44.0° – 50.0°	110°F min & within 6°F of issue tank/drums 46.0° – 53.0°	Every 7 days.
8.	Dedicated Defuelers. (Prior to sampling, drain filter separator sump until clear product is obtained.)	Free water Color & particle FSII Flash API gravity @ 60°F	5 ppm Not to exceed A1, B1, or G1 and must meet acceptable particle rating. 0.07 – 0.20% 140°F min 44.0° – 50.0°	5 ppm Not to exceed A1, B1, or G1 and must meet acceptable particle rating. 0.07 – 0.20% 110°F min 46.0° – 53.0°	Every 30 days and/or prior to returning defueled product to storage tanks or drums. (In event of failure, product shall be downgraded to JP-8 at one part JPTS to one part JP-8 or one part JP-7 to four parts JP-8.)
9.	Tanker Aircraft.				

Table 6-1. JP-7 and JPTS Fuel Sampling Requirements and Test Limits - Continued

Item	Sample Point	Test	Test Limits		Sample Frequency
			JP-7	JPTS	
9a.	Scheduled Tanker (includes ground spares): sump sample from forward, aft, and upper deck sumps.	Visual	Clear and bright with no visual sediment.	Clear and bright with no visual sediment.	Two hours prior to scheduled flight time.
		Flash	140°F min	110°F min	
		API gravity @ 60°F	44.0° – 50.0°	46.0° – 53.0°	
9b.	Strip Alert Tankers: sump sample from forward, aft, and upper deck sumps.	Visual	Clear and bright with no visual sediment.	Clear and bright with no visual sediment.	One hour prior to alert time and every 6 hours thereafter.
		Flash	140°F min	110°F min	
		API gravity @ 60°F	44.0° – 50.0°	46.0° – 53.0°	

CHAPTER 7
TEST METHODS

7.1 TEST METHODS.

7.2 VISUAL INSPECTION.

Use a clean, dry, round or rectangular, clear 1-quart glass bottle.

a. Check the sample visually for moisture contamination. This contamination may be found in the form of very fine droplets which appear as a cloud, or in the form of droplets which will cling to the sides of the container. The fuel sample should be clear and bright.

b. Swirl the sample so that a vortex is formed. Any sediment present will accumulate on the bottom of the bottle directly beneath the vortex. Sediment should be no more than a slight smudge if picked up on a fingertip. If the visual inspection procedure indicates contamination of sample, drain at least 1 gallon of fuel from the sample location and discard. Take another sample from this location and recheck.

7.3 FREE WATER DETERMINATION.

a. General.

(1) The Aeronautical Engine Laboratory (AEL) Water Detector and the Gammon Aqua-Glo Water Detector are portable instruments used to quantitatively determine the free water present in fuel.The principle of both instruments is the reaction between free water in the fuel and a dye, sodium fluorescein, on the detector pad. Due to subjectivity of the (AEL) Water Detector, the Gammon Aqua-Glo Water Detector is the preferred method. When viewing the detector pad by the AEL method, a distinct yellow color is noted if free water is present. Compare this color with an AEL printed standard to determine the quantity of free water present in Parts Per Million (PPM). Replace and date the AEL printed standard annually. The Gammon Aqua Glo Water Detector comes equipped with a permanent fluorescing standard. To determine water content, the operator adjusts the diaphragm lever arm until the fluorescing standard and the test pad show equal brightness. Water detector procedures by either method are applicable for dynamic line samples only; that is, taking the fuel sample directly from the fuel system and through the test pad without exposing the sample to the atmosphere or to a sample container.

(2) Clean the stainless steel Millipore detector pad holder with a dry cloth or paper material. This detector pad holder can be used with both Millipore and Gammon in-line samplers.

(3) One-quart polyethylene or clear glass sample bottles may be used with the AEL and Gammon Aqua Glo.

(4) Do not remove the test pad from the hermetically sealed package until ready for use. The operator will inspect every water detector pad before use. Discard the pad if it is not orange in color. A yellow or slightly yellow pad indicates water exposure.

b. Procedures for Determination of Free Water by the AEL Method.

(1) Remove the pad from the wrapper with forceps and place it in the stainless steel detector pad hold, orange side up. Do not handle detector pads with fingers. Press the detector holder together tightly. With the inlet side up, place the holder in the in-line sampler and screw the top of the sampler down tightly. Connect sampler to sample point.

(2) Turn the valve on the in-line sampler to the FLUSH position (see Figure 7-1, View A) and flush 300 ml of fuel. After flushing, turn the valve to TEST position (see Figure 7-1, View B) and pass through the pad 300 ml of fuel into a graduated container. At completion of operation, turn valve to OFF position and disconnect sampler.

(3) Remove the detector pad holder from the in-line sampler. Connect the metal syringe to the detector pad holder and remove excess fuel. Using forceps, take the pad from the holder. If necessary to transport the pad to the laboratory, return the pad to a dry used AEL detector pad envelope. Fold the open end of the envelope to secure and protect the pad. Or you may use a clean, dry (used) matched weight or single monitor filter base with plugs inserted.

WARNING

Eye exposure to the ultraviolet light should be minimized as much as possible.

(4) Remove the pad from the holder placing the orange side up in the free water detector slide depression. Light the bulb by holding the switch in the ON position and insert the slide containing the pad. For detectors equipped with two switches, light the bulb by pressing both switches simultaneously, release the red switch while holding the front switch in the ON position, and insert the slide containing the pad. Compare the fluorescence of the detector pad to that of the standards. Free water is indicated in parts per million by the standards. If the detector pad and the standards do not exactly match, estimate as closely as possible.

(5) Clean the reuseable equipment and discard the used pads in a solid waste container.

(6) Use and Maintenance of the AEL – water detector battery and battery case is optional.

c. Procedures for Determination of Free Water by the Gammon Aqua Glo Detector.

(1) Calibration – an encapsulated pad labeled CALIBRATING STANDARD is provided in an envelope in each kit. Note the SET number on the back of this pad and place it in the test pad window with the colored side facing the instrument. Turn on the ultraviolet lamp and then press the switch button on the photocell comparator. Adjust the light modulating lever until the red pointer is steady at the 0 (zero) in the center of the meter. To eliminate errors caused by clearance in the mechanical linkage always move the 8 modulation lever in the same direction when zeroing the photocell comparator for calibrating or testing. If the reading obtained does not agree with the SET number on the calibrating standard, remove the plug screw on the side of the photocell comparator (at the 45° bend), insert a small screwdriver and adjust the photocell comparator as necessary. Repeat the above procedure until the rating obtained agrees with the calibrating standard SET number. The instrument should be calibrated prior to first use each day. Return the calibrating standard to the envelope in the kit. Do not use a calibrating standard from another kit. Each calibrating standard is matched to a fluorescing standard.

(2) Attach the test pad holder assembly to the fuel line quick-disconnect coupler. Open the toggle valve by lifting the handle. Allow at least 300 ml of fluid to pass through the assembly. Opening and closing the valve several times will insure better flushing. Remove the assembly after flushing.

(3) Open the test pad holder assembly and insert a test pad using forceps. Be sure that the orange colored side of the pad is facing upstream.

(4) Pass 500 ml of fuel through the pad, accurately measuring the test sample quantity. If the reading exceeds the scale and it is desired to get an approximate water content, a sample volume down to 100 ml may be used. When this is done multiply the result by a factor, determined by dividing the volume used in ml into 500 ml.

(5) Remove the test pad from the holder using forceps and press between dry paper blotters or absorbent towels to remove excess fuel. To blot, press firmly three or four times with heel of hand.

(6) For maximum accuracy, determine the test result as soon as possible after sampling. If the test pad is not read immediately after sampling place in a desiccator to prevent moisture pickup from the air. However, avoid ratings made on dried test pads since they will give high and erroneous results. Conversely, rating an unblotted pad will give a low reading.

(7) Using forceps, put the pad into the instrument test pad window. Turn on the lamp and press the photocell button. Continuously zero the photocell comparator by adjusting the light modulating lever until there is steady reading for 10 – 15 seconds. Turn off the instrument light immediately after use to conserve battery power.

7.4 FUEL SYSTEM ICING INHIBITOR (FSII).

The two standard methods used to determine the % of DIEGME present in turbine fuels are the HB (B2) and Brix scale refractometers. Both refractometers measure the refractive index of a water extract.

a. The B2 FSII test kit is the preferred method and only its test procedures are covered herein. Refer to the Brix operating instructions shipped with the equipment for use of the Brix. The Brix and the B2 methods are essentially the same. While all methods correlate, the refractometer methods require no chemical or environmental support and are quick and easy without any sacrifice of accuracy. Field tests are performed in a bare base environment using the ancillary equipment in the kit with available light. When using the refractometer in the fuel laboratory, the use of glassware in lieu of field ancillary equipment is optional. The refractometer

is a very delicate optical instrument and should be handled with extreme care to avoid damage to the lens and window elements. Test procedures for the B2 FSII test kit and refractometer are:

(1) In a clean and dry quart container, obtain at least a one-pint fuel sample.

(2) Set up support stand, rod, base, and ring, and fill an aluminum dish ½ full of water (tap water is satisfactory).

(3) Calibrating the Instrument – hold the refractometer in a horizontal position. Lift the prism cover plate; make sure the prism and coverplate are clean. Use the plastic dipstick or a common plastic stirring rod to prevent scratching the prism, place a few drops of the water sample from the aluminum dish on the face of the prism. Close the coverplate and observe through the eyepiece the location of the line in the viewer. Use the plastic dipstick to adjust the set screw (in the base) so that the line intersects the zero line of the scale. Clean coverplate and prism. Calibrate daily or when changing test water.

(4) Transfer 160 ml of the fuel to a separatory funnel.

(5) Using a syringe/pipette, add 2 ml of water to the separatory funnel. Cap the funnel and shake vigorously for 5 minutes. Then place the funnel in the ring stand and allow a minimum of two minutes for fuel water separation.

(6) Carefully open the separatory funnel drain cock so that a trickle of the water layer can be taken in a clean, dry aluminum dish or glass container. Two or 3 drops is sufficient.

(7) Reading the Instrument – lift the prism cover-plate, with the dipstick or a plastic stirring rod place a few drops of the test sample on the face of the prism. Hold the instrument in a horizontal position. Keep the coverplate in contact with the prism and point the instrument toward a window or other illuminating source. Look through the eyepiece and take a reading at the point where the dividing line between light and dark crosses the scale. Record the results on a work sheet or the AFTO Form 150.

(8) Properly dispose of the unused fuel and water. Wash the glassware in soap and water and air-dry.

b. Procedure for Determining DIEGME FSII Content – to determine the DIEGME content, using the refractometer method, read the M or DIEGME scale which is located on the left side of the optical viewing area.

c. FSII Use Limits – the use limit for FSII is 0.07% minimum – 0.20% maximum per volume. FSII concentrations of 0.10% or greater will lower the freeze point of small quantities of free water in fuel systems to a point as low as that of the fuel itself under all operating conditions and locations. The icing protection decreases as the FSII content decreases. Fuel containing below 0.07% FSII content will be upgraded as soon as possible to use limits by commingling available stocks, local injection of FSII during intratank transfer, or by resupplied stocks. Since FSII is preferentially soluble in water, prevention and elimination of water from fuel transport and storage systems is essential. Any tank which shows an abnormal increase in water content must be sampled immediately to determine the FSII content of the product.

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7.12 INTERPRETATION OF FSII RESULTS.

The use limit for FSII is 0.07% minimum to 0.20% maximum by volume. Since the maximum procurement level is 0.15%, instances of the fuel containing 0.20% are unusual. The icing protection decreases as the FSII content decreases. Fuel containing below 0.07% FSII content will be upgraded by commingling with available stocks, local injection of FSII, or by means of resupplied stocks.

7.13 SEDIMENT CONTAMINATION — IN-LINE SAMPLER METHOD.

7.14 GENERAL.

A 1-gallon sample is passed through the in-line sampler containing a monitor with a single filter. The color of the Millipore filter and the quantity of particles retained on the filter are compared with fuel color and particle standards provided in the Filter Color and Contamination Standards for Aviation Turbine Fuels.

7.15 SAMPLING CONNECTIONS.

The in-line sampler requires quick-disconnect valves to be installed throughout the system at sampling locations required herein. Dust plugs are to be inserted when the quick-disconnect valves are not in use. The items to be used are as follows:

- Coupler, NSN 4730-00-978-8760 (1/4 inch nipple), or NSN 4730-00-943-8716 (1/8 inch nipple)
- Dust Plug, NSN 5340-00-706-1036

The referenced parts are of aluminum construction. Stainless steel couplers are also permitted. In fixed systems, a ball Type 303 stainless steel, teflon seat and seals, ¼-inch NPT female inlet and outlet valve will be installed upstream of the quick-disconnect valve. On mobile equipment, the quick-disconnect valve will be installed on the single point nozzle.

7.16 EQUIPMENT REQUIRED.

Item	NSN
Monitor Kit Fuel Sampling, GTP – 172H	6630-01-230-2652
Sampling Hose, GTP-5808 (order for above)	4720-01-230-8529
Single Filter Monitor, Millipore	6630-00-445-3662
Steel, Stainless w/3-Way Valve (for Millipore in-line sampler)	6630-00-488-6622
Aviation Turbine Fuel Contamination Standards	6640-00-326-7684
Syringe, Metal w/2-Way Valve	6640-00-070-4874
Plastic Solvent Dispenser	6640-00-299-8493
Petroleum Ether	6810-00-584-3079
Coupler, P/N AVEAC4-4M	4730-00-978-8760 (inch nipple)
Coupler, P/N AVEAC4-2M	4730-00-943-8716 (1/8 inch nipple)
Plug, P/N AMPE-4	5340-00-706-1036
Jet Test QD Coupler, GTP-235 1/4 inch (fits D-1 nozzles)	4730-01-135-7461
Sampling Valve Assembly, GTP	423 4820-01-170-7087

7.17 PREPARATION OF APPARATUS.

a. Preparation of New Filtration Apparatus – if the apparatus is new, disassemble all components and place them in a clean container filled with clean fuel. Soak parts, and with a small brush scrub all metal surfaces, valves, and gaskets. Rinse with filtered fuel and let the parts drain thoroughly on a lint-free Kimwipe. Reassemble the apparatus and store in a clean, dust-free container.

b. Preparation for Taking Samples – wipe off any dust on the outside of the single filter monitor with a lint-free tissue. Open the in-line sampler, and remove the protective caps from the monitor. Insert the monitor into position, with the wheel markings on the bottom. Reassemble the sampler. Save the protective caps. See Figure 7-1.

7.18 SAMPLING PROCEDURE.

a. Remove the dust cap from the sampling valve and the in-line sampler inlet line, make connections, and turn the T-valve to the OFF position. Connect the remote sampling hose to the collection container. Allow approximately one pint of fuel to flow through the flushing line and then turn the T-valve so the fuel will pass through the monitor. Allow lines to flush for 10 – 15 seconds and then turn the T-valve so that the fuel will pass through the monitor. Allow 1 gallon of fuel to pass through the monitor. Shut off the flow and disconnect the in-line sampler from the sampling valve.

b. Replace the dust plug on sampling valve. After waiting at least one minute for electrostatic charge relaxation, disassemble the in-line sampler and remove the monitor (keep the sampler in an upright position). Use the metal syringe to completely evacuate excess fuel from the monitor. To enhance accuracy when rating the filter membrane above a color rating of 0, carefully remove the top cover from the monitor exposing the filter.

c. Using the Filter Color and Contamination Standards for Aviation Turbine Fuels, match the color intensity of the filter to the closest matching color on the color scales of the evaluation guide. Separately rate the quantity of solids using the particle assessment scale of the guide.

d. Single filter monitors may be reused one time when the filter membrane's color rating is not greater than 0, and when the top cover has not been removed. Monitors having the potential for reuse will be marked with a grease pencil by placing an X on the inlet plug.

7.19 INTERPRETATION OF RESULTS.

a. The Filter Color and Contamination Standards for Aviation Turbine Fuels consists of a visual assessment colors scale and a particle assessment guide which illustrates various levels of contamination. Compare the membrane color to the color standards and the particles to the contamination standard and rate the membrane accordingly. Record particle assessment as Acceptable (a), Marginal (m), or Unacceptable (u).

b. If the Millipore filter is ruptured during sampling, the test is not valid. A retest is required. In the case of an aircraft, servicing the servicing unit must be resampled immediately during recirculation. In the case of a hose cart, it will be sampled during dispensing into a refuel or defuel unit.

7.20 ACCEPTABLE LIMITS.

See Table 6-1 for acceptable membrane rating limits.

7.21 SEDIMENT CONTAMINATION — BOTTLE METHOD.

There may be situations where it is not practical or possible to use the in-line sampler to take a sediment sample. In these situations determining solids contamination in accordance with T.O. 42B-1-1 may be used. Limits for the bottle method are as follows:

a. Samples taken downstream of filter separators should not exceed 2.0 mg/gallon.

b. Samples taken from bulk tanks should not exceed 3.0 mg/gallon.

7.22 FLASH POINT.

7.23 SCOPE.

This method describes a procedure for determining the flash point of fuel by the Pensky-Martens flash tester.

7.24 SUMMARY OF METHOD.

The sample is heated at a slow, consistent rate with continual stirring. A small flame is directed into the cup at regular intervals with simultaneous interruption of stirring. The flash point is the temperature at which the vapor above the sample temporarily ignites without supporting continuous burning.

7.25 EQUIPMENT REQUIRED.

Item	NSN
Flash Tester (w/accessories)	6630-00-530-0987
Thermometer ASTM 9°F for Flash Tester (20°F – 230°F)	6685-00-242-2183
Propane Gas Cylinders	6830-00-584-3041
Gas Control Valves & Lines	Locally Procured

7.26 PREPARATION OF APPARATUS.

WARNING

During flash point determination, all flammable chemicals or fuels in the laboratory will be tightly capped and placed in a closed cabinet. The test will be performed in a draft-free room.

Support the tester on a level, steady table. Unless tests are made in a draft-free room or compartment, surround the tester on three sides with a shield, each section of which is about 18 inches wide and 24 inches high.

7.27 PROCEDURE.

Thoroughly clean and dry all parts of the cup and its accessories before starting the test. Fill the cup with JP-7 to be tested to the level indicated by the filling mark. Place the lid on the cup and place in the heater. Take care to have the locking device properly engaged. Insert the thermometer. Light the test flame and adjust it to 5/32-inch in diameter. Supply heat at such a rate that the temperature, as read on the thermometer, increases 9 – 11°F per minute. Turn the stirrer 90 – 130 rpm, stirring in a downward direction.

a. Apply the test flame at the start of test, and again when the temperature of the sample reaches 120°F. For JPTS fuel, apply the test flame at the start of test, and again when the temperature of the sample reaches 90°F. Thereafter, apply the test flame at each 2°F rise. The test flame is applied by operating the mechanism on the cover which controls the shutter and test flame burner so that the flame is lowered into the vapor space of the cup in a 0.5 second, left in its lowered position for 1 second, and quickly raised to its high position. Discontinue stirring while applying the test flame.

b. Record as the flash point the temperature read on the thermometer at the time the test flame application causes a distinct flash in the interior of the cup.

Sometimes the test flame during application is surrounded with a bluish halo as the flash point temperature is approached. Do not confuse the true flash with this halo. At least two tests on the same sample should be run.

7.28 API GRAVITY DETERMINATION.

Use an API Gravity to determine volume correction, aircraft fuel weight, floating roof displacement calculations, or multiple product pipeline operations. This measurement is most accurate when the temperature is near the standard temperature of 60°F (16°C); however, gravity determination may be made between 30°F (-1°C) and 90°F (32°C). The hydrometer and cylinder should be approximately the same temperature as the sample to be tested.

a. Pour the sample into the clean graduated cylinder. Place the cylinder containing the sample in a vertical position in a location free from air currents that would affect the hydrometer floating freely away from the walls of the cylinder. The temperature of the surrounding medium should not change more than 5°F (3°C) during the test.

b. Lower the hydrometer gently into the sample. When it has settled, depress it about 2 scale divisions into the liquid, then release, keeping the rest of the stem dry since unnecessary liquid on the stem changes the weight of the instrument and affects the result. Spin the hydrometer slightly upon release which allows it to float freely away from walls of the cylinder. Allow the hydrometer to become completely stationary and all air bubbles to come to the surface.

c. Read the hydrometer to the nearest scale division. The correct reading for transparent liquids is that point on the hydrometer scale at which the principle surface of the liquid cuts the scale. Determine this point by placing the eye slightly below the level of the liquid and slowly raising it until the surface, first seen as a distorted ellipse, appears to become a straight line cutting the hydrometer scaled. Record the temperature of the sample to the nearest °F. See Figure 7-2.

d. When thermo-hydrometers are used, stir the sample by carefully raising and lowering the hydrometer. The temperature can be read after the hydrometer reading has been observed.

e. Correct the observed API Gravity to API Gravity at 60°F (16°C) using ASTM D 1250, Volume I, Table 5A for JP-4 and commercial Jet B. To correct the observed API Gravity of JP-8 to API Gravity at 60°F (16°C), use ASTM D 1250, Volume II, Table 5B. Record the observed API Gravity/Temperature and corrected API Gravity at 60°F (16°C).

f. To correct measured volume to 60°F (16°C) net volume, use ASTM D 1250, Volume I, Table 6A for JP-4 and commercial Jet B. To correct measured volume of JP-8 to 60°F (16°C) net volume, use ASTM D 1250, Volume II, Table 6B.

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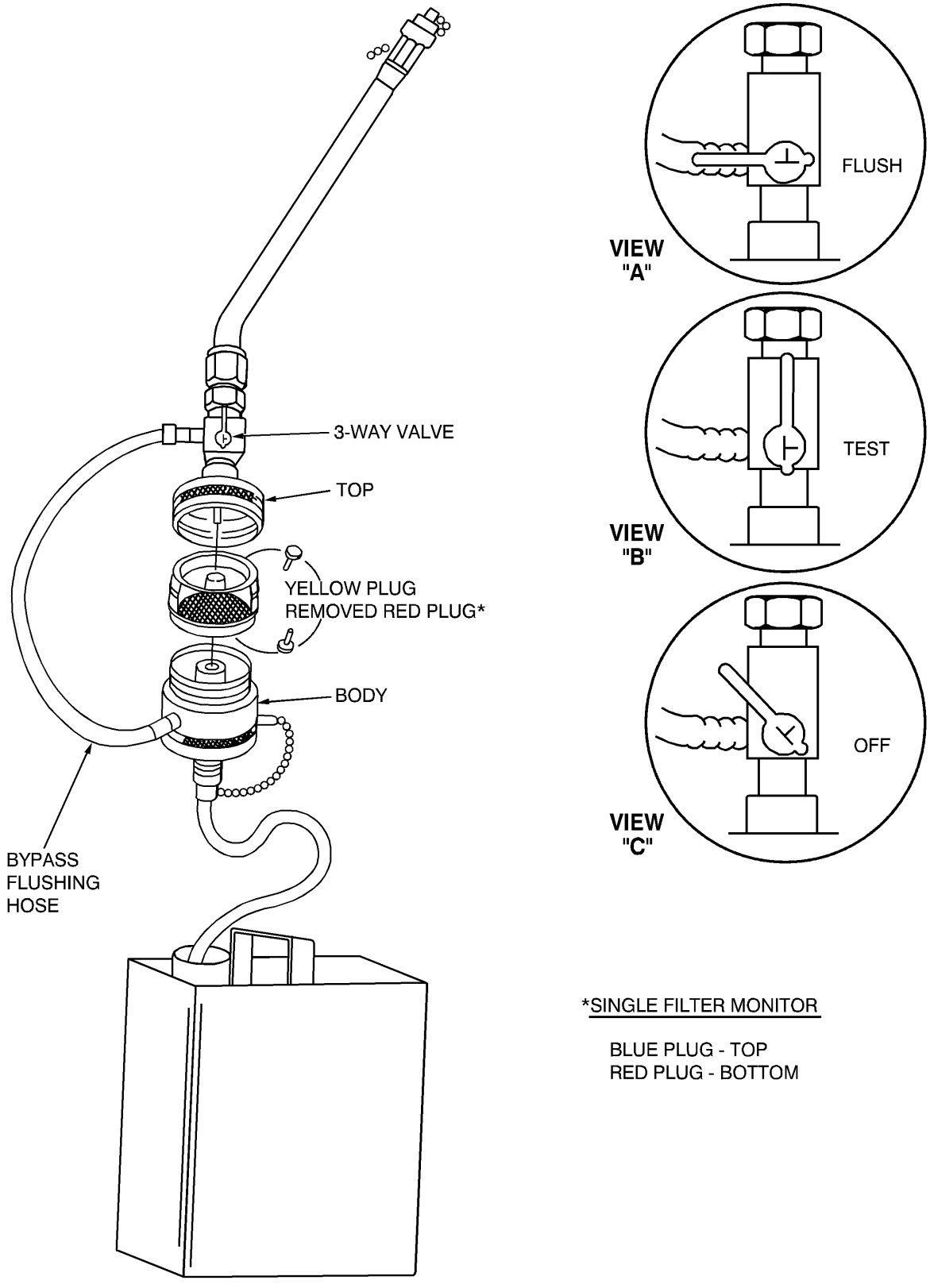

Figure 7-1. In-Line Sampler

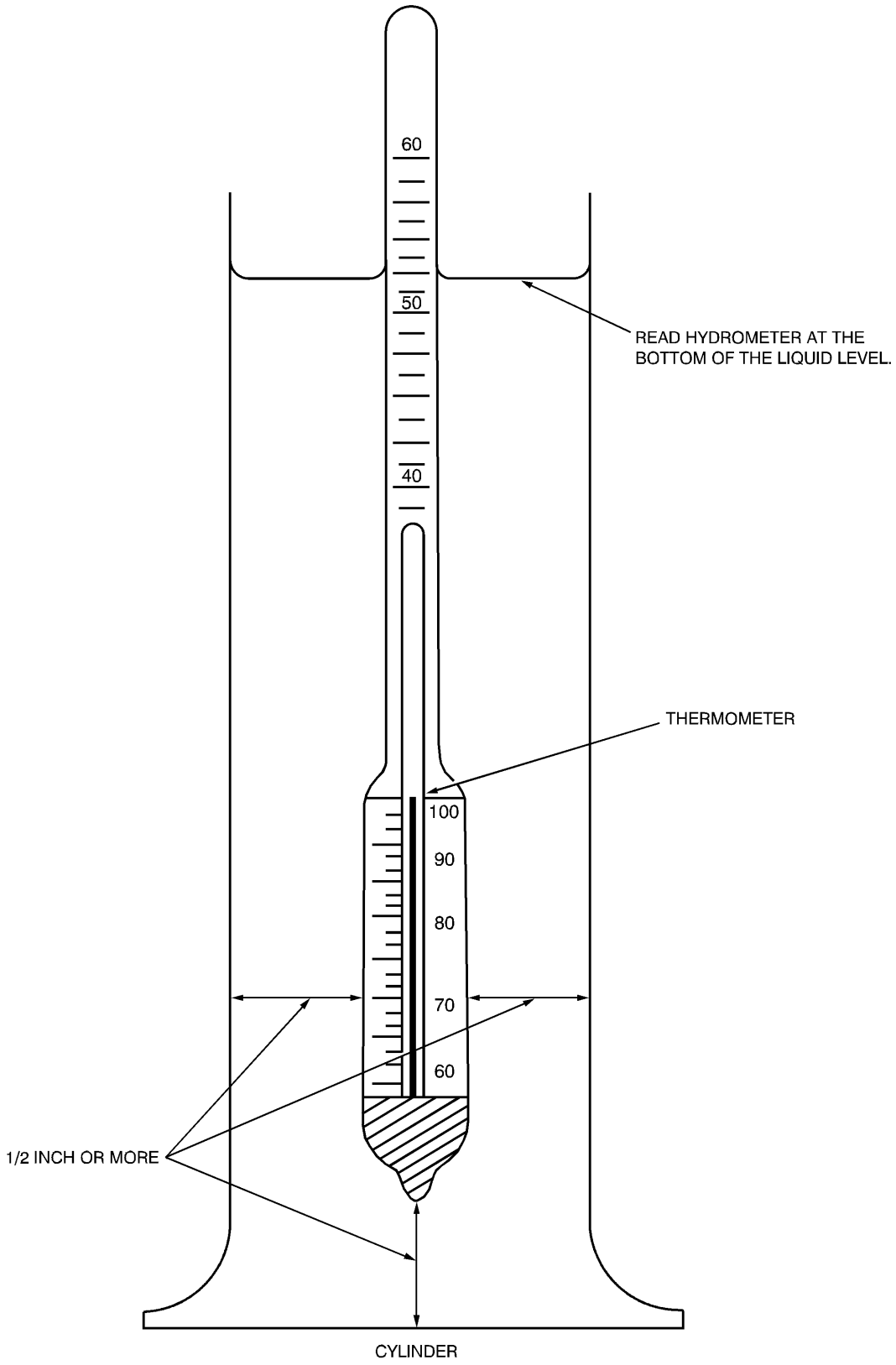

Figure 7-2. Hydrometer

CHAPTER 8
PROCEDURES FOR USING BLADDER FUEL STORAGE TANKS WITH JP-7 AND JPTS

8.1 PROCEDURES FOR USING BLADDER FUEL STORAGE TANKS WITH JP-7 AND JPTS.

Before either type bladder may be used for JP-7 or JPTS they must be flushed with the fuel they are to be filled with.

8.2 3,000 GALLON BLADDER (ABFDS).

a. Fill the bladder with 1,000 gallons of the required grade. Soak the bladder for a minimum of 72 hours. There is no maximum soak time. After 72 hours soak time, empty the bladder. Blend the soak fuel back into bulk storage at a ratio of one part JP-7 to four parts JP-8 or one part JPTS to one part JP-8.

b. Add 500 gallons of the required grade to the bladder and thoroughly flush by walking on top of the bladder to assure all areas inside are covered with fuel. Empty the bladder and blend the flush fuel back into bulk storage at a ratio of one part JP-7 to four parts JP-8, or one part JPTS to one part JP-8. The bladder is now ready for use and may be filled with the intended fuel or rolled and stored in accordance with applicable instructions. The bladder should hold JPTS or JP-7 within use limits for 6 months or longer.

8.3 50,000 GALLON BLADDER (ATHRS).

a. Fill the bladder with 5,000 gallons of the required grade. Soak the bladder for a minimum of 72 hours. There is no maximum soak time. After 72 hours soak time, empty the bladder and blend the soak fuel at a ratio of one part JP-7 to four parts JP-8 or one part JPTS to one part JP-8.

b. The bladder is now ready for use and may be filled with the intended fuel or the bladder may be stored in accordance with applicable instructions. The bladder should hold JPTS or JP-7 within use limits for 6 months or longer.

8.4 QUALITY CONTROL PROCEDURES.

a. The pumping system used with the 3,000 gallon bladder (ABFDS) system must be flushed with 50 gallons of fuel prior to pumping fuel from the bladder each time the unit has not been used for 24 hours or longer.

b. The R-14 pumping unit must be flushed with 100 gallons of fuel prior to pumping fuel from the bladder each time the unit has not been used for 24 hours or longer.

c. After filling the bladder, let the fuel sit for at least 1 hour, then take a 1-quart sample and test for API gravity, flash point, color, FSII, and visual appearance.

d. Test limits:

(1) API Gravity – the API gravity for JP-7 shall be between 44.0° and 50.0° and for JPTS between 46.0° and 53.0°, both at 60°F. The results shall not differ more than ±0.50° API from the source of fuel value.

(2) Flash Point – the flash for JP-7 shall be at least 140°F and for JPTS at least 110°F. The results shall not differ more than ±6°F from the source of fuel value.

(3) Saybolt Color – the color shall not differ from the source fuel result by more than two color units.

(4) FSII – the FSII content must be between 0.07 – 0.20 Volume %.

(5) Visual – the visual examination shall indicate clear and bright fuel with no evidence of sediment or free water.

e. If the fuel fails any of the above limits, except FSII content, place the tank in hold status and submit a 2-gallon sample to the area laboratory for analysis (Paragraph 3.6). Fuel that fails FSII limits will be upgraded before use. Contact WR-ALC/AFTH, Wright-Patterson AFB, OH for upgrading instructions.

f. Sampling frequency:

(1) The tests required in Step c will be performed after initial fill and every 7 days thereafter and after new product is added to the bladder tank.

(2) After initial fill and every 90 days thereafter a 2-gallon sample will be submitted to the area lab for analysis (Paragraph 3.6).